REMARKS/ARGUMENTS

1. The Office Action (1) rejected claims 1, 3 and 4 under 35 U.S.C 103(a) as being unpatentable over Matsuda et al. (JP 2-301133), in view of Lee et al. (U.S. 2003/0068898); (2) rejected claims 5-20, 22-58, and 65-69 under 35 U.S.C 103(a) as being unpatentable over Matsuda et al. and Lee et al., and further in view of TW article (Stress Control in Multi-Layer Backside Metallization of Thinned Wafers), APA (Admitted Prior Art), and LW article (Tailoring Sputtered Cr films on Large Wafer); and (3) allowed claims 59-64 and objected to claim 21 as being dependent upon a rejected claim.

2. Regarding the rejection based on Matsuda et al. in view of Lee et al., Applicant submits that the present invention is not obvious over the prior arts of the combination of Matsuda et al. and Lee et al. for the following reasons:

- Different mechanism. The present invention provides a *physical* RF plasma etch at high inert gas pressure with low energy ions while Matsuda et al. and Lee et al. both provide a *chemical* RF plasma etch.

Physical plasma etch, also called sputtered etch, relies on the bombardment of inert species striking the substrate surface to knockout the atoms from the substrate surface. The inert species, being excited by the plasma, are accelerated toward the substrate. The physical hitting of the inert species against the substrate surface is the mechanism of the etching. The inert atoms are preferably heavy elements (such as Ar, Xe, Kr, etc.), since light element such as Helium is too light to achieve an effective etch rate. Since the mechanism of physical etch is the physical bombardment of inert species, selectivity is practical impossible.

Chemical plasma etch, also called dry etch or reactive ion etching, relies on the volatile by-products of a chemical reaction of the plasma-excited reactive species (typically F or Cl) with the substrate material. For example, in silicon etch, the reactive species of F reacts with Si to form the volatile product SiF, which then is removed to the exhaust. Since the mechanism of chemical etch is the chemical reaction, high selectivity can be accomplished.

Applicant submits that Matsuda et al. employs chemical plasma etch, as evidence of the mentioning of dry etch technique, the high selectivity specification, and most conclusively, the reactive species of CF_4, CCl_2F2, CCl_4 (p. 158, bottom right box, line 12).

Similarly, Lee et al. also employs dry etch technique, achieves high selectivity, and employs reactive species of CF_4 and CH_xF_y (abstract, lines 5-7, for example). Lee et al. also employs inert gas, but probably only for dilution and plasma enhancement effects. The main ingredients of Lee et al. are CF_4, CH_xF_y, and O_2 as disclosed in the abstract and various other places in the specification. Even with the disclosure of inert gas, Lee et al. only uses inert gas for replacing or adding to O_2, thus the main reactive species are still CF_4 and CH_xF_y.

For example, in paragraph [0009], lines 4-7, Lee et al. discloses *"the reactive gas of CF_4 / CH_xF_y / O_2 or inert gas"*. Applicant submits that the meaning of this sentence is a reactive gas of a combination of CF_4 / CH_xF_y / (O_2 or inert gas), and not either a reactive gas of (CF_4 / CH_xF_y / O_2) or a reactive gas of (inert gas). The main reason that applicant claims that Lee et al. does not use inert gas as a main reactive gas comes from the claims. In claim 11, Lee et al. added an inert gas to the combination of (CF_4 / CH_xF_y / O_2). In claim 14, Lee et al. uses a combination of CF_4 / CH_xF_y / O_2 / inert gas.

Thus, Applicant submits that both Matsuda et al. and Lee et al. employ reactive species of F and/or Cl to etch the substrate (in a chemical etch mechanism), in contrast to the present invention employing inert gas to etch the substrate (in a physical etch mechanism).

- Different process. The present invention employs one (1) step of RF plasma etch using inert gas to create a surface roughness while Matsuda et al. employs three (3) steps of: - depositing a layer of silicon; - oxidizing the silicon layer to form silicon oxide; and - selective plasma etch between silicon and silicon oxide by reactive species of CF_4, CCl_2F2, CCl_4 to create a surface roughness. Lee et al. only discloses a selective etching method using different reactive species of CF_4 / CH_xF_y / (O_2 or inert gas).

- Different process limitation. The process from Matsuda et al. relies on the non-uniformity of the oxidation process, which results in a non-uniform oxide thickness. If the oxidation process is perfectly uniform, the surface underwent Matsuda et al.'s process would not be rough. In contrast, the present invention has no oxidation process, and no such limitation.

- Different roughness size. The surface roughness of Matsuda et al.'s process is in the order of 100Å - 1000Å (p. 159, top left box, lines 8-9) while the roughness present invention is atomic size (order of 10Å) to accommodate a deposited layer of a few hundred angstroms (paragraph [31]).

Thus, Applicant submits that the present invention is not obvious to persons with ordinary skill in the art following a combination of Matsuda et al.' and Lee et al.'s teaching due to different mechanism, different process, different process limitation and different roughness size.

Claims 3 and 4 are dependent upon allowable independent claim 1, and are, thus, allowable for the same reasons.

3. Applicant has cancelled claims 5-21. For claims 22-69, Applicant submits that the creation of the microscopic surface roughness is novel against Matsuda-Lee following the above reason, and thus the additional references of TW article, APA, and LW article would not render these claim obvious.

Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

The Commissioner is authorized to charge any underpayment or credit any overpayment to Deposit Account No. 06-1325 for any matter in connection with this response, including any fee for extension of time, which may be required.

Respectfully submitted,

Date: 11/17/05

By: _____
Sheldon R. Meyer
Reg. No. 27,660

FLIESLER MEYER LLP
Four Embarcadero Center, Fourth Floor
San Francisco, California 94111-4156
Telephone: (415) 362-3800